FEBL610Q304-01

ML610Q304 Reference Board
User's Manual

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Preface

This user's manual provides comprehensive explanation about ML610Q304 Reference Board.

Together with this manual, please also refer to the following documents.

- ML610Q304 User's Manual
  The manual to explanation about ML610Q304

- µEASE User's Manual
  The manual to explanation about µEASE / on-chip debugging tool

1. Outline

1.1 Features

This reference board enables the customers to evaluate the functionalities of ML610Q304 and bears several pads for mounting additional devices.
By using together another board called "µEASE (a On-chip Debug Emulator from Lapis)" & its bundled software development tool, software development, debugging and Flash ROM writing are possible too.
It is possible to utilize this reference board without µEASE by simply connecting the power supply.
Please go through this manual when using this board.

1.1.1 Features of board

・ML610Q304 is mounted (or 28pin IC socket is mounted)
・Flash ROM programming and on-chip debugging are possibe（TEST0、TEST1_N pins are provided）
・High expandability – Micro's pins are set on through-holes intended for connecting with other board(s)
・Power supply is selectable, either from µEASE from other board.
・Service pads are provided for mounting additional components that may be necessary to check / evaluate Micro's functionalities.

1.1.2 Specifications of board

* Please refer to p.5 "circuit diagram" for detailed connectivity for mounted components.

Mounted micro	・ U1 / U2（mounted type / socket type）: ML610Q304
Mounted components	・ PWR: Input power supply switching jumper（3pin pinheader & short pin）
	・ VREF: VREF input pin（3pin pinheader & short pin）
	・ SPEAKER: Speaker jack
	・ R1-R3: Resistor for Light Emitting Diode（P20-P22）
	・ P20-P22: Light Emitting Diode
	・ CNUE: Connector (14 pin) for On-chip debug emulator
	・ C1-C8: Capacitor for power supply（8pieces）
Pads for additional componets	・ C9-C11: SA-ADC Capacitor for power supply line（3pieces）
	・ CN1-CN3: Connector bads for other board(s) （ 6pin, 7pin, 12pin, 2.54mm pitch）
	・ SP1-SP6: Lands for pouwer supply line
	・ SP7-SP9: Non-resistance chips for connecting LED
	・ SP10: SPVDD select pint for input power supply
Other service pads	・ UVDD、VDD、VSS、AIN0-AIN2
Drive voltage	・ +2.0～+5.5V
Outer dimensions	・ 60.00 x 70.00 mm

1.2 Outlook

The photo of ML610Q304 Reference Board is as below Figure 1 & 2.

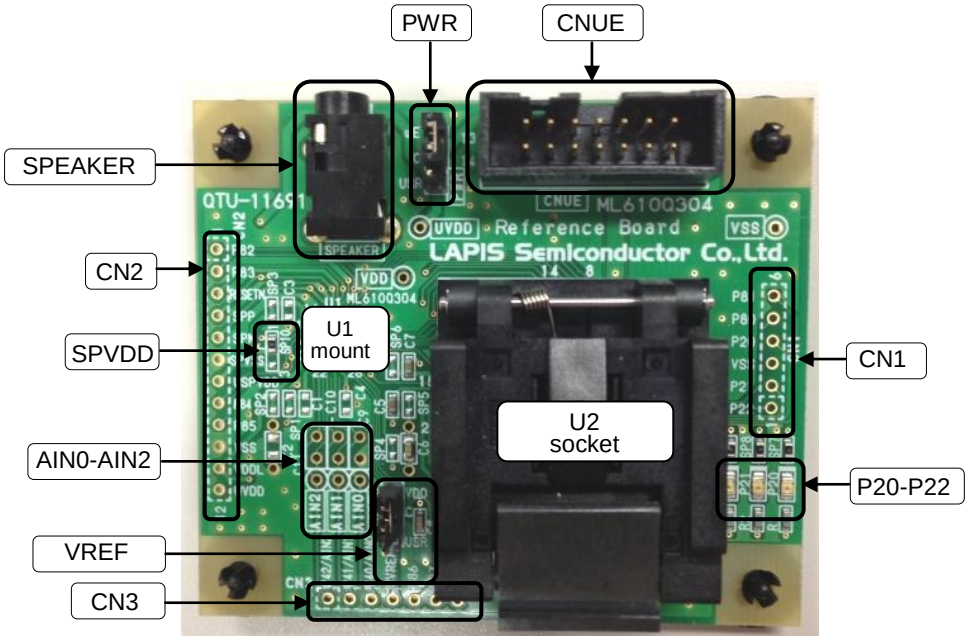


Figure 1. ML610Q304 Reference Board outlook

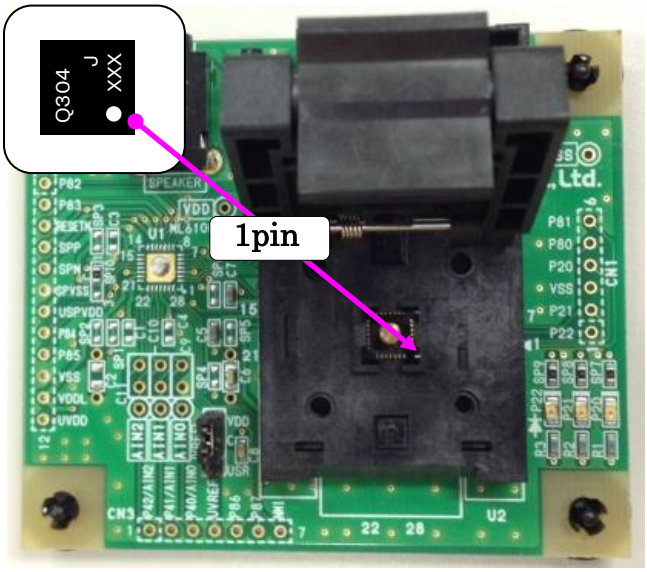


Figure 2. ML610Q304 Reference Board – Orientation of mounting IC

* Cautions)
Pleases set the IC on the board after turning the power off, in the correct orientation.

2. Function

2.1 PWR jumper

PWR jumper is for selecting power source line for this board.

If from µEASE, please set to "uEASE" side of PWR jumper. (Capaity :+3.3V/100mA)
If from UVDD pin, please set to "USR" side of PWR jumper.

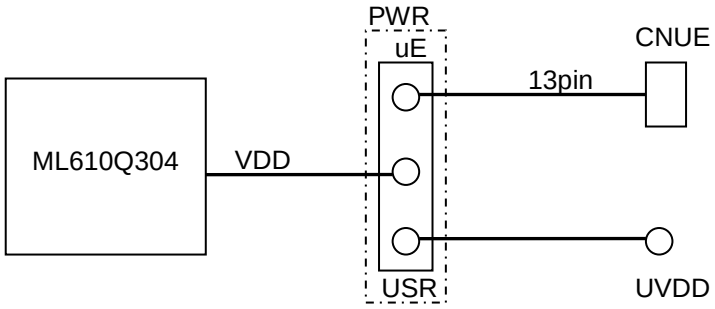


Figure 3. PWR jumper

Cautions)
If PWR jumper is set to "USR" side for connecting to µEASE,
the customer's set should be turned on after µEASE is connected.
µEASE should be put off after the user's sytem is turned off.

2.2 VREF jumper

VREF jumper is for selecting the line for power supply to VREF pin.
If supply from VDD, VREF jumper should be set to "VDD" side.
If supply from UVREF pin, VREF jumper should be set to "USR" side.

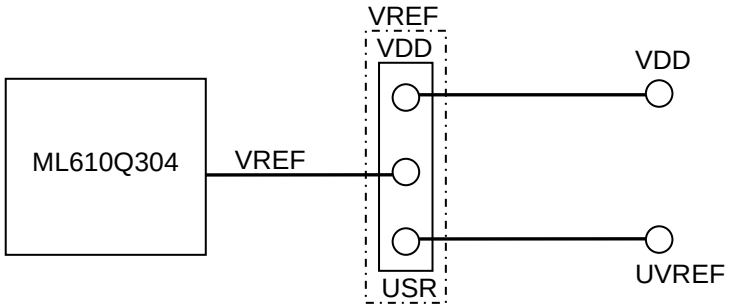


Figure 4 VREF jumer

Cautions)
If VREF jumper is set to"USR"side for connecting µEASE,
the user's system should be turned on after µEASE is connected.
µEASE should be put off after the user's sytem is turned off.

2.3 SPVDD Jumper

SPVDD jumper is to select the power supply line for SPVDD pin.

If from VDD, please set to"1" of SPVDD jumper (SP10)
If from SPVDD pin, please to "3" of SPVDD jumper.

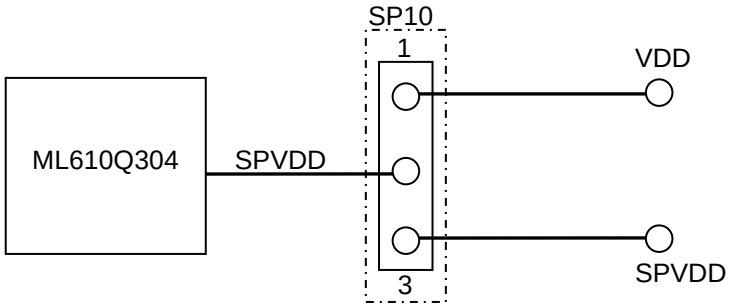


Figure 5. VREF jumper

Cautions)
When setting to "3" of SPVDD jumper for connecting to µEASE, please turn on the customer's system only after finishing the connection.
Also, please turn off the customer's system first before stopping µEASE.

2.4 When using sequential comparator ADC

Please connect to AIN0-AIN2 on the board to run the data through AD conversion.
If input from CN3 is not used, please input from the holes near CN3
Also, please add noise-reduction capacitor(s) C9-C11 as appropriate, if necessary.

See Figure 5 below as an example.

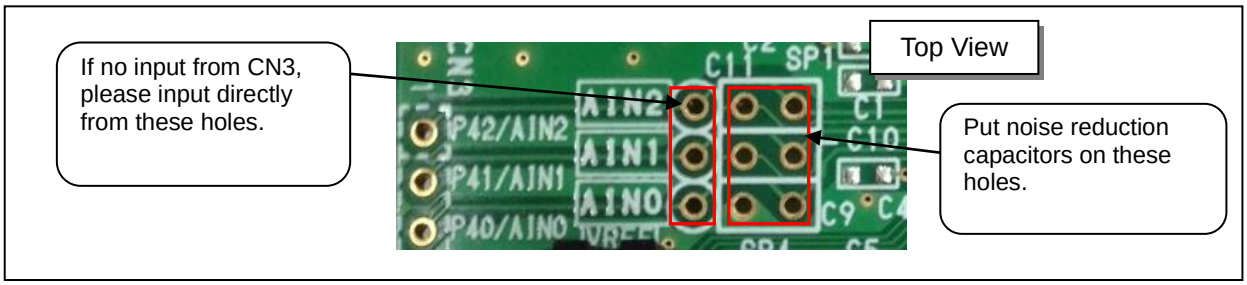


Figure 6, An example of ADC (sequential comparator) AIN0-AIN2 mounting

2.5 If LED does not emit

P20-P22 pins enable direct drive of LED. As LED(s) are connected to non-resitance chip(s) on this board, SP7-SP9 should be removed if LED is not driven.

See Figure 6 below for rerence.

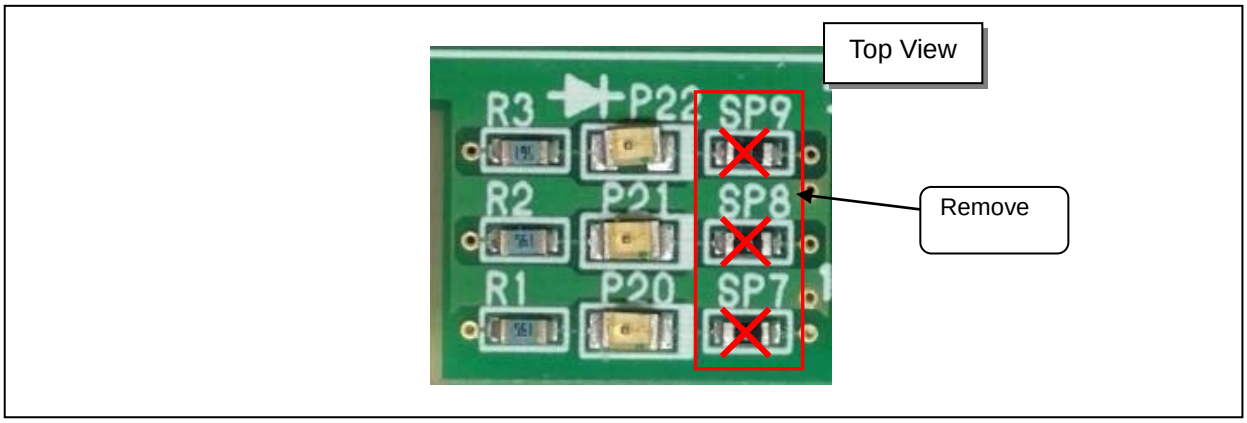


Figure 7 SP7-SP9 Pads example

2.6 Cut-off power supply

Please cut off the patterns of SP1/SP4 (VDD)、SP3/SP6 (SPVDD).
Also, please cut SP5 pattern if getting VDDL-VSS apart.

See Figure 7 for an example below.

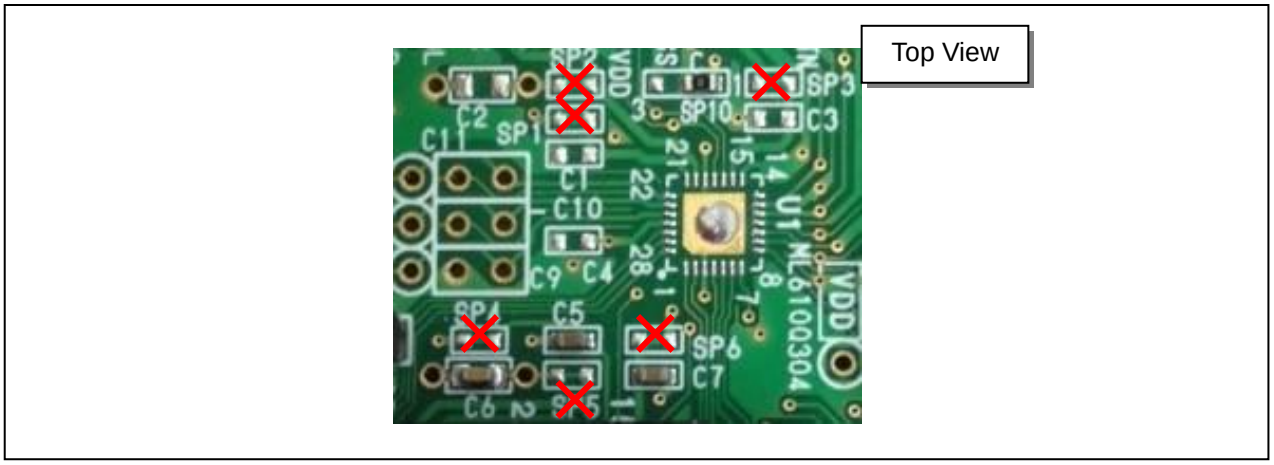


Figure 8 An example of power cut-off

3. User Interface

3.1 User Interface for ML610Q304 Reference Board

Following is the table of pin-out of CN1/CN2/CN3 for the ML610Q304 Reference Board (ML610Q304 is mounted)

Table 1. ML610Q304 Reference Board CN1/CN2/CN3

ML610Q304		ML610Q304 Reference Board		Remarks
PIN	Name	User connector	PIN	
1	P22	CN1	1	Connecting also to LED
2	P21	CN1	2	Connecting also to LED
3	VSS	CN1	3	
4	P20	CN1	4	Connecting also to LED
5	P80	CN1	5	
6	P81	CN1	6	
7	TEST1_N	—	—	Connecting to µEASE connector
8	TEST0	—	—	Connecting to µEASE connector
9	P82	CN2	1	
10	P83	CN2	2	
11	RESET_N	CN2	3	
12	SPP	CN2	4	Connecting to speaker jack
13	SPM	CN2	5	Connecting to speaker jack
14	(NC)	—	—	
15	SPVSS	CN2	6	Connecting to VSS
16	SPVDD	CN2	7	Connecting to VDD
17	P84	CN2	8	
18	P85	CN2	9	
19	VSS	CN2	10	
20	VDDL	CN2	11	
21	VDD	CN2	12	Switchable µEASE 3.3V ⇔ jumper
22	P42/AIN2	CN3	1	Input through-hole available
23	P41/AIN1	CN3	2	Input through-hole available
24	P40/AIN0	CN3	3	Input through-hole available
25	VREF	CN3	4	Switchable VDD ⇔ jumper
26	P86	CN3	5	
27	P87	CN3	6	
28	NMI	CN3	7	

4. Cautions when using

(1) The contents of this manual, due to improvement of device and involved technologies, may be changed with / without prenotice.

(2) Please read the ML610Q304 manual and µEASE manual when working with boards.

(3) On this board, Engineering Sample of ML610Q304 may be mounted.
For final cofirmation on electric characteristics, please do it with ML610Q304 from massproduction and also on the customer's board for massproduciton.

(4) We do not offer repair service for this board. The replacement board will be offered when the failure is notified at early stage.

(5) Please CN2_3 pin (RESET_N) open when using µEASE.
（When preparing RESET_N signal on other board, please add jumper pin and leave it open）

(6) This board has patterns on the reverse side, so that please take care to avoid "short" with other board/ components conductive (particularly when the board is set over them.)
Use of any insulative materials inbetween, or applying protective sheet on the reverse-side pattern or applying the rubber legs on the board to keep distance.

5. Outline of reference board and circuit diagram

Specification & circuit diagram of reference boards are stated herein after.

5.1 Specification of reference board

Below is the basic specification of ML610Q304 Reference Board

- Dimesion : Vertical 60mm × horizontal 70mm
- Layer : two (2) layers
- Thickness : 1.6mm
- Conductor pitch : 2 lines between the pins
- Conductor width : Powerline＝0.3mm、signal line＝0.15mm
- Rubber cap : 4 pieces (locations)

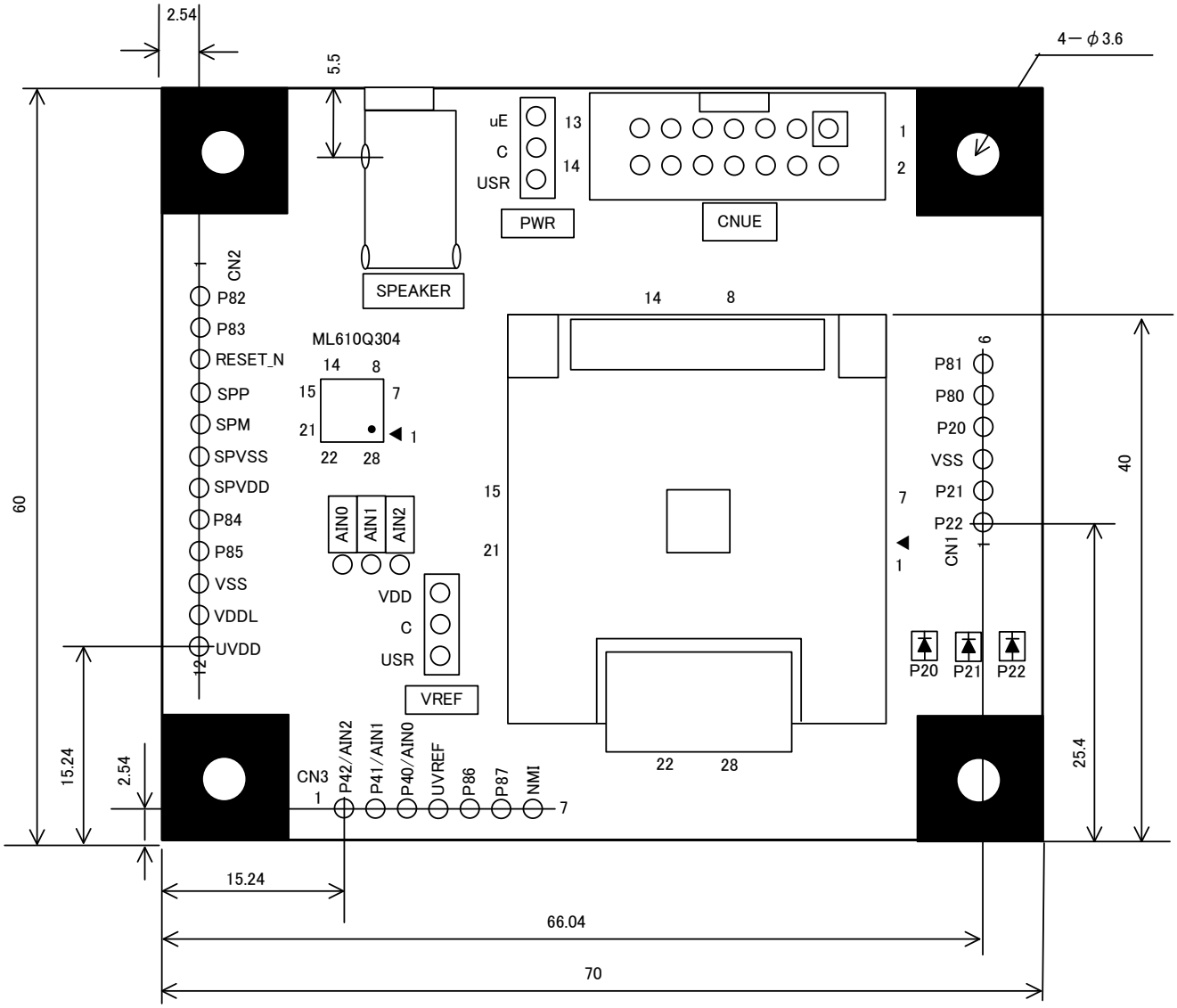
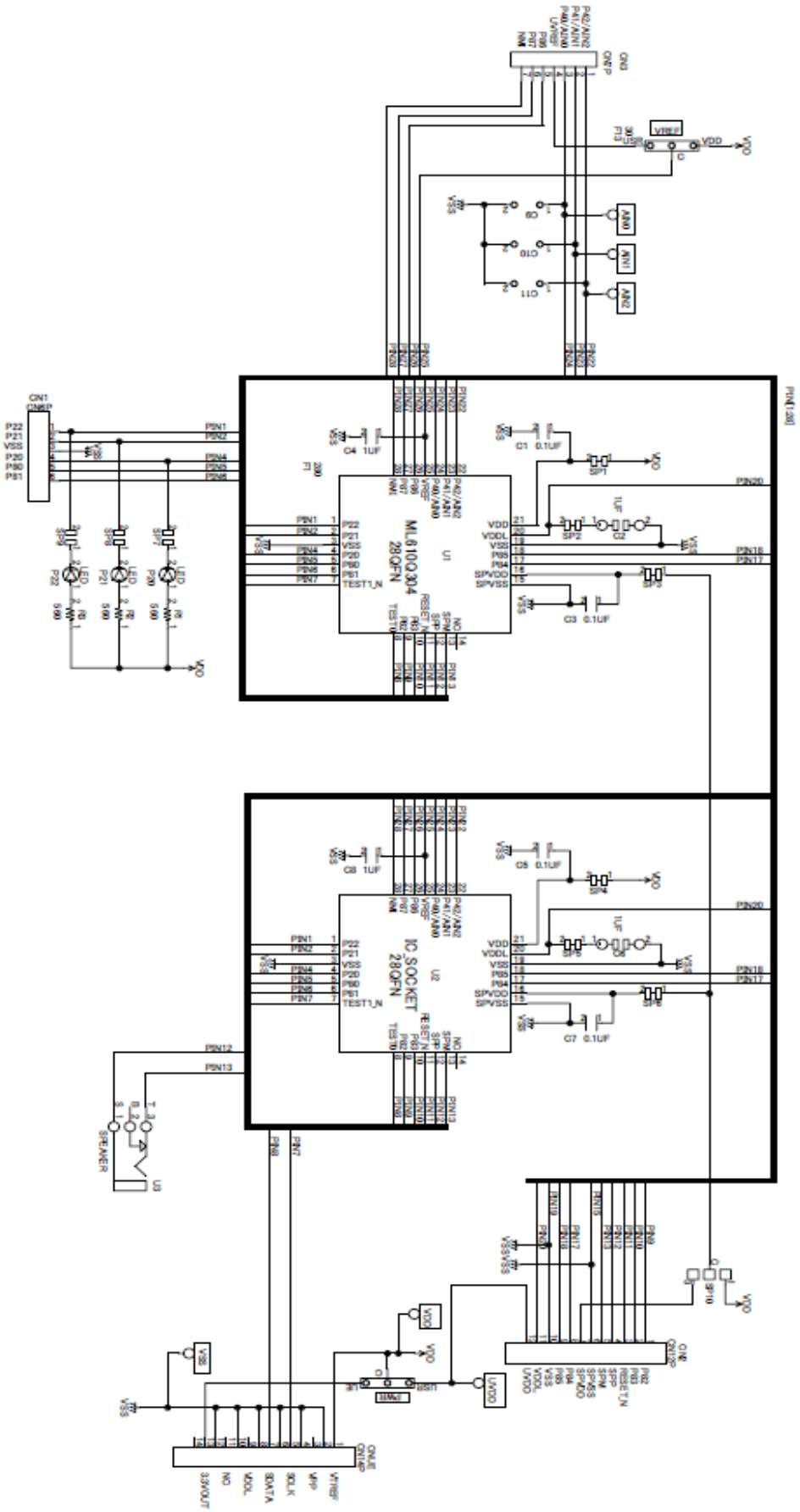


Figure 9　Dimension of board (top view)

5.2 Circuit Diagram

Circuit diagram of ML610Q304 Reference Board is show on the next page.


ML610Q304
28QFN
IC_SOCKET
28QFN
SPEAKER
VDD
VSS

Revision history

Document No.	Issue date	Page		Contents of change
		Before	After	
FEBL610Q304RB-01	2014.12.2	–	–	1st version issued